Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims

1. (Currently amended) A system for rapidly generating multiple alternative pilot training and transition plans which include a recall of furloughed pilots for an entire airline, which comprises:

a user interface receiving input data and user requests including a request to recall said furloughed pilots;

a database having stored therein said input data and a current pilot training and transition plan; and

an optimizer system in electrical communication with said user interface and said database for receiving said user requests, said input data, and said current pilot training and transition plan for generating [[an]] MIP Model which includes said recall of said furloughed pilot, wherein MIP is mixed integer problem, and rapidly solving said MIP Model to provide said multiple alternative pilot training and transition plans[[.]];

wherein said MIP Model includes following objective function:

<<Start underline>>

$$Minimize \quad PNH\sum_{t}\sum_{h} NHCost_{ht}y_{NHht} + PNA\sum_{t}\sum_{i\in NA} NACost_{it}y_{it} +$$
$$PF\sum_{t}\sum_{i\in F} FCost_{it}y_{it} + Ppay(\sum_{i\in\lambda_1} a_i R_i + \sum_{i\in SBY} a_i R_{SBi} + \sum_{i\in\lambda_2} a_i M_i) +$$
$$PS * PBH\sum_{h}\sum_{t} S_{ht} / Blockhrs_{ht} + PE * PBH * (1/3)\sum_{h}\sum_{t} E_{ht} / Blockhrs_{ht} +$$
$$PF\sum_{t}\sum_{i\in\lambda_{FR}} FRCost_{it}y_{FRit}$$

<<End underline>>

wherein PNH is Level of importance of New Hire Cost in the solution;

$NHCost_{ht}$ is Cost per new hire advanced to position h in period t (computed as the number of month between t and the end of the planning horizon, times the pay rate, times the average pay hours);

PNA is Level of importance of no-awards cost in the solution;

$NACost_{it}$ is Cost if pilot i ∈ NA is released in bid period t (computed as the number of months between t and the beginning of the planning horizon, times the pay rate, times the average pay hours);
$FCost_{it}$ is Cost if pilot i ∈ F is furloughed in bid period t (computed as the number of months between t and the beginning of the planning horizon, times the pay rate, times the average pay hours);
Ppay is Level of importance of pay protection cost in the solution;
PS is Level of importance of shortages in block hours in the solution;
PE is Level of importance of excess in block hours in the solution;
PF is Level of importance of furloughs cost in the solution;
PBH is Cost associated to each block hour missed due lack of crews; and
$Block_{ht}$ is Business plan block hours for position h in bid period t.

2. (Original) The system of Claim 1, wherein said multiple alternative pilot training and transition plans are generated in less than one hour, and are cost optimized.

3. (Original) The system of Claim 1, wherein said recall of said furloughed pilots occurs in order of seniority and before any new pilots are hired.

4. (Original) The system of Claim 1, wherein said user requests include a user option to limit percentage of pilots whose start bid periods for training assignments occur outside of a bid period of said current pilot training and transition plan.

5. (Original) The system of Claim 1, wherein said user requests include a user option to limit total percentage of pilots whose start bid periods for training assignments occur within a bid period of said current pilot training and transition plan, and of said pilots whose start bid periods for training assignments occur outside of said bid period.

6. (Canceled)

7. (Currently amended) The system of Claim 1 [[6]], wherein said MIP Model includes following constraint to ensure that said furloughed pilots are recalled in seniority order:

$$\sum_{t=k}^{N} y_{FRit} - \sum_{t=k}^{N} y_{FRI-1t} \leq 0 \qquad \forall i \in \lambda_{FR}, k \in \{1..N\}$$

8. (Currently amended) The system of Claim 1 [[6]], wherein said MIP Model includes following constraint to ensure that new pilots are hired after all of said furloughed pilots are recalled:

$$y_{NHht} - MNH_{ht} \sum_{t=1}^{k} y_{FRI't} \leq 0 \qquad \forall h, k \in \{1..N\}$$

9. (Currently amended) The system of Claim 1 [[6]], wherein said MIP Model includes following constraints to limit percentage of pilots whose start bid periods for training assignments may deviate from a bid period of said current pilot training and transition plan:

(i) $\sum_{t} t y_{it-L(i)} - W_i - d_i + q_i = 0 \quad \forall i \in \lambda;$

(ii) $d_i + q_i \leq BigM * h_i \qquad \forall i \in \lambda;$ and

(iii) $(\sum_{i \in Adv_t} h_i / U_t) \leq P\_U_t \qquad \forall t \in \{1..N\}.$

10. (Currently amended) The system of Claim 1 [[6]], wherein said MIP Model includes following constraints to limit total percentage of pilots whose start bid period for training assignments may be changed to occur within a bid period of said current pilot training and transition plan, and of said pilots whose start bid period for training assignments may be changed to occur outside of said bid period:

(i) $diff_{it} = 1 - y_{it}$ $\forall i \in \lambda, t \in \{1..N\} \mid CM_{it} = 1;$

(ii) $diff_{it} = y_{it}$ $\forall i \in \lambda, t \in \{1..N\} \mid CM_{it} = 0;$ and

(iii) $\sum_{i \in \lambda} diff_{it} / U_t \leq P\_U_t$ $\forall t \in \{1..N\}.$

11. (Currently amended) A system for rapidly generating multiple alternative pilot training and transition plans which include a limit to changing start bid periods for training assignments for an entire airline, which comprises:

a user interface receiving input data and user requests including a request to limit changes to said start bid periods;

a database having stored therein said input data and a current pilot training and transition plan; and

an optimizer system in electrical communication with said user interface and said database for receiving said user requests, said input data, and said current pilot training and transition plan, for generating an MIP Model which includes said limit, wherein MIP is mixed integer problem and rapidly solving said MIP Model to provide said multiple alternative pilot training and transition plans[[.]];

wherein said MIP Model includes a following objective component for tracking payroll cost of pilots recalled from furlough:

<<Start underline>>

$$PF \sum_{t} \sum_{i \in \lambda_{FR}} FRCost_{it} y_{FRit}$$

<<End underline>>

12. (Original) The system of Claim 11, wherein said limit applies to a percentage of pilots whose start bid periods for training assignments may deviate from a bid period of said current pilot training and transition plan .

13. (Original) The system of Claim 11, wherein said limit applies to total percentage of pilots whose start bid period for training assignments may be changed to occur within a bid period of said current pilot training and transition plan, and of said pilots whose start bid period for training assignments may be changed to occur outside of said bid period.

14. (Canceled)

15. (Original) The system of Claim 11, wherein said multiple alternative pilot training and transition plans are cost optimized, and a following objective component for tracking payroll costs of pilots recalled from furlough is included in the MIP model:

$$PF\sum_{t}\sum_{i\in\lambda_{FR}} FRCost_{it}\, y_{FRit}$$

16. (Currently amended) A system for generating multiple alternative pilot training and transition plans which include a recall of furloughed pilots for an entire airline, which comprises:

a user interface receiving input data and user requests including a request to recall said furloughed pilots ;

a database having stored therein said input data; and

an optimizer system in electrical communication with said user interface and said database for receiving said user requests and said input data, and generating therefrom an MIP Model including said recall of said furloughed pilots, wherein MIP is mixed integer problem, and for solving said MIP Model to rapidly generate said multiple alternative pilot training and transition plans[[.]];

wherein said multiple alternative pilot training and transition plans are cost optimized and generated in less than one hour, and said MIP Model includes a following objective component for tracking payroll costs of pilots recalled from furlough:

<<Start underline>>

$$PF\sum_{t}\sum_{i\in\lambda_{FR}} FRCost_{it}\, y_{FRit}$$

<<End underline>>

17. (Canceled)

18. (Original) The system of Claim 16, 18. The system of Claim 16, wherein said MIP Model includes following constraints to limit percentage of pilots whose start bid periods for training assignments may differ from a specific bid period:

(i) $\sum_{t} t y_{it-L(t)} - W_t - d_i + q_i = 0 \quad \forall i \in \lambda;$

(ii) $d_t + q_i \le BigM * h_i \quad \forall i \in \lambda$; and

(iii) $(\sum_{i\in Adv_t} h_i / U_t) \le P\_U_t \quad \forall t \in \{1..N\}.$

19. (Original) The system of Claim 16, wherein said MIP Model includes following constraints to limit total percentage of pilots whose start bid period for training assignments may be changed to occur within a specific bid period, and of said pilots whose start bid period for training assignments may be changed to occur outside of said bid period:

(i) $diff_{it} = 1 - y_{it} \quad \forall i \in \lambda, t \in \{1..N\} \mid CM_{it} = 1;$

(ii) $diff_{it} = y_{it} \quad \forall i \in \lambda, t \in \{1..N\} \mid CM_{it} = 0$; and

(iii) $\sum_{i\in\lambda} diff_{it} / U_t \le P\_U_t \quad \forall t \in \{1..N\}.$

20. (Currently amended) An optimizer system including a database for rapid generation of multiple alternative pilot training and transition plans that accommodate a recall of furloughed pilots, which comprises:

data means for receiving user requests and input data from a user;

operating means in electrical communication with said data means for generating variables and constraints from said user requests and said input data, for generating an MIP Model from said variables and said constraints which provides for said recall of said furloughed pilots in seniority order and before hiring of new pilots, wherein MIP is mixed integer problem; and

means for solving said MIP Model with said variables and said constraints to generate therefrom said multiple alternative pilot training and transition plans with cost factor optimization[[.]];

wherein said MIP Model includes a following objective function:

<<Start underline>>

$$Minimize\ \ PNH\sum_{t}\sum_{h} NHCost_{ht}y_{NHht} + PNA\sum_{t}\sum_{i\in NA} NACost_{it}y_{it} +$$
$$PF\sum_{t}\sum_{i\in F} FCost_{it}y_{it} + Ppay(\sum_{i\in\lambda_1} a_i R_i + \sum_{i\in 58Y} a_i R_{58i} + \sum_{i\in\lambda_2} a_i M_i) +$$
$$PS * PBH\sum_{h}\sum_{t} S_{ht} / Blockhrs_{ht} + PE * PBH * (1/3)\sum_{h}\sum_{t} E_{ht} / Blockhrs_{ht} +$$
$$PF\sum_{t}\sum_{i\in\lambda_{FR}} FRCost_{it}y_{FRit}$$

<<End underline>>

21. (Original) An optimizer system including a database for rapid generation of multiple alternative pilot training and transition plans that include a recall of furloughed pilots, which comprises:

data means for receiving user requests including a request to" recall said furloughed pilots, and for receiving input data, and a current pilot training and transition plan;

operating means in electrical communication with said data means for receiving said user requests, said input data, and said current pilot training and transition plan, for generating variables and constraints therefrom, and for generating an MIP Model from said

variables and said constraints to provide said recall of said furloughed pilots in seniority order and before hiring of new pilots, and provide a limit to deviating start bid periods for training assignments with respect to a bid period of said current pilot training and transition plan; and

means for solving said MIP Model with said variables and said constraints to generate said multiple alternative pilot training and transition plans with cost optimization.

22. (Original) The optimizer system of Claim 21, wherein said limit is applied to a percentage of pilots whose start bid periods for training assignments occur outside of said bid period.

23. (Original) The optimizer system of Claim 21, wherein said limit is applied to a total percentage of said furloughed pilots whose start date for training assignments is changed to occur within said bid period, and of said furloughed pilots whose start date for training assignments is changed to occur outside of said bid period.

24. (Canceled)

25. (Canceled)

26. (Canceled)

27. (Canceled)

28. (Canceled)

29. (Canceled)

30. (Canceled)

31. (Canceled)